

## FURTHER NOTES ON THE CUMACEA OF SOUTH AUSTRALIAN REEFS

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Fig. 1-9.

SINCE the publication of the last records of Cumacea from South Australia (Hale, 1936) collecting has been continued. As a result the following species are added to the forms known to occur in the littoral fauna of our State.

*Cyclaspis cottoni* sp. nov.

*Paradiastylis tumida* sp. nov.

*Dic brevidactylum* sp. nov.

*Nannastacus nasutus* var. *camelus* Zimmer.

*Schizotrema depressum* Calman.

Twenty-one species have now been taken on the shore-line of Gulf St. Vincent and Spencer Gulf. The limestone reef at Port Willunga, three miles north of Sellick's reef, was worked systematically and, as would be expected, all the species recorded from the last-named were found at Port Willunga also.

The Cumacean fauna occurring on loose stones on our reefs is remarkably uniform. If short, filamentous algae are present to retain a film of sand even the smoothest rocks harbour Cumacea and other small Crustacea. For instance, in March of this year, Messrs. B. C. Cotton and K. Sheard spent a couple of hours on a tiny shingle patch in shallow water at Marino, a few miles from Adelaide. Here they immersed the larger smooth pebbles in weak formalin as previously described and obtained the following species:

### FAMILY BODOTRIIDAE

CYCLASPIS PURA Hale.

(A fully adult male has the hairs of the pleopods much longer than in the type.)

PICROCUMA POECILOTA Hale.

## FAMILY DIASTYLIDAE

PACHYSTYLIS VIETUS Hale.

COLUROSTYLIS WAITEI (Hale).

(See Zimmer, 1930, p. 651.)

GYNODIASTYLIS SIMILIS Zimmer.

GYNODIASTYLIS TURGIDUS Hale.

## FAMILY NANNASTACIDAE

NANNASTACUS GIBBOSUS Calman.

CUMELLA LIMA Hale.

CUMELLA LAEVE Calman.

SCHIZOTREMA BIFRONS var. ACULEATA Hale.

Again I have to acknowledge my indebtedness to Mr. K. Sheard who spent many days painstakingly sorting out thousands of small crustaceans from fine debris.

## FAMILY BODOTRIIDAE

CYCLASPIS G. O. Sars.

CYCLASPIS COTTONI sp. nov.

*Ovigerous female.* Integument firm but easily broken; surface slightly glossy, squamose. Carapace with dorsal edge, when viewed from the side, slightly irregular, less than one-third total length of animal, its depth more than half its length and less than its greatest breadth. Pseudorostral lobes not quite reaching apex of eye-lobe. Most of the several ocular lenses, black. Antennal notch wide and deep, and tooth acute. Anterior half of carapace with a sharp dorsal keel, on each side of which is a shallow depression; there is a double pit at the middle of the length of the carapace and posterior to these indentations the keel bifurcates (the divergent portions being swollen and less elevated) forming a single keel again just before reaching the hinder margin. Most of the first pedigerous somite concealed; second to fifth somites with a low but distinct dorsal carina; third to fifth, each with a pair of dorso-lateral elevations.

Pleon somites all feebly keeled above and with small lateral articular processes on all but sixth; first to fourth and telsonic somite of approximately equal length; fifth distinctly longer.

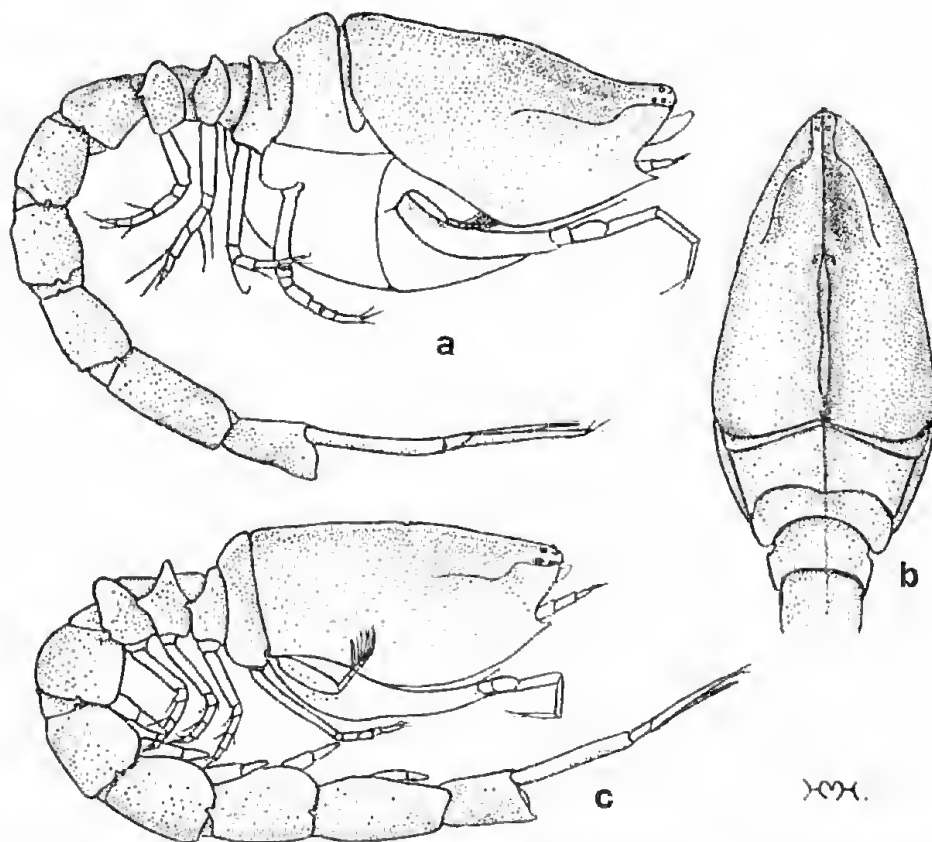


Fig. 1. *Cyclopsis cottoni*. Type female; a, lateral view; b, dorsal view of carapace. c, Lateral view of allotype male (all  $\times 38$ ).

First antennae with third segment longer than second and with first as long as second and third together; inner flagellum minute, elongate and apparently two-jointed; outer two-jointed, the first segment three times as long as second.

Basis of second maxillipeds a little longer than rest of appendage and with an apical plumose seta. Basis of third maxillipeds wide, strongly geniculate, distinctly longer than the "palp" and with outer apical portion expanded, and extending forwards beyond level of insertion of carpus; outer distal part of merus also expanded and reaching almost to level of apex of carpus, which is distally expanded on the inner side. First pereopod with carpus reaching to apex of antennal angle; basis curved, subequal in length to remaining joints together, with inner (or ventral) distal portion produced into a sharp tooth and with a long plumose apical seta on opposite side; ischium and merus together as long as carpus which is a little longer than propodus (15:14); dactylus three-fourths as long as

propodus, and with two unequal apical spines. Second peraeopods with basis as long as remaining joints together; ischium short and merus longer than carpus; dactylus a little shorter than carpus and propodus together and with three unequal spines at the oblique apex. The last three pairs of limbs offer no special features. Peduncle of uropods nearly half as long again as telsonic somite, slender, with inner edge feebly serrate; exopod four-fifths as long as peduncle, a little longer than endopod and narrowly truncate distally, with two unequal terminal spines; endopod slender, distally pointed and with inner edge serrated for portion of its length.

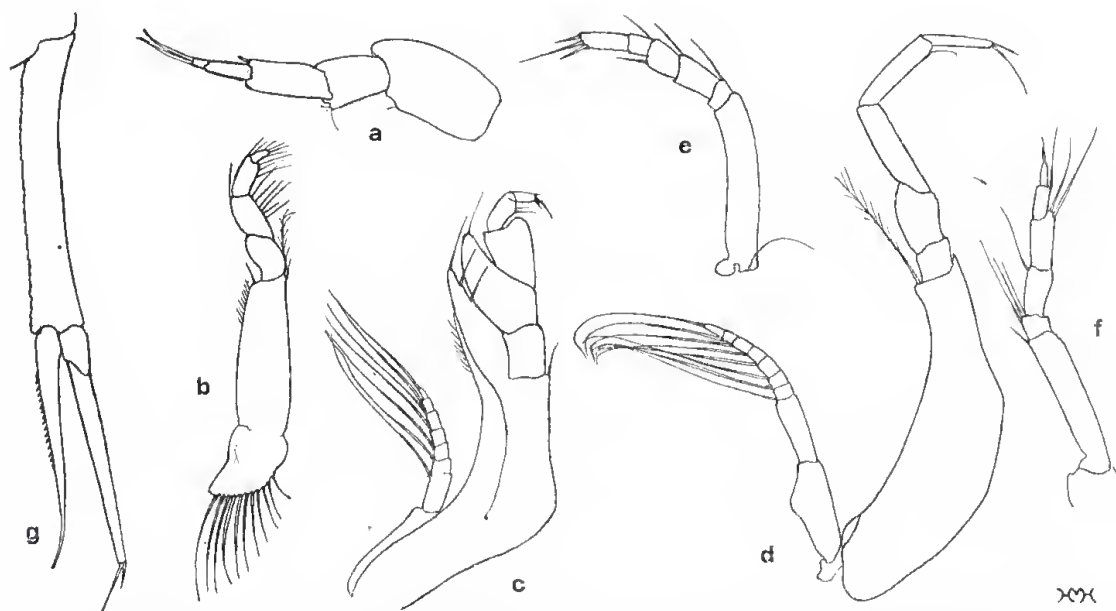


Fig. 2. *Cyclops cottoni*. Paratype ovigerous female; a, first antenna; b and c, second and third maxillipeds; d, e and f, first, second and fourth peraeopods; g, uropod (a,  $\times 96$ ; b-g,  $\times 62$ ).

Colour white with sooty markings and mottlings.

Length 3.3 mm.

*Male*. Differs from female in having carapace less deep, in the much larger ocular lenses, and in having the first pedigerous somite wholly concealed. The second pedigerous somite is shorter and its crest is less elevated. The infero-lateral portions of the first to fifth pleon somites are expanded downwards as usual in this sex.

Length 3.2 mm.

*Loc*. South Australia: Spencer Gulf, Port Germein, "burrowing in dirty sand between tide marks" (B. C. Cotton, Apl., 1937). Types in South Australian Museum, Reg. No. C. 2140-2141.

This is one of the several Cumacea new to South Australia which have been collected by Mr. Cotton, and I have pleasure in associating his name with it. It

was secured by stirring sand in a bucket of sea water and straining out the disturbed Crustacea.

Although the carapace exhibits no bold sculpture, the impressions at the termination of the anterior, clear-cut part of the dorsal carina and the waviness of the more faintly marked, double posterior portion are responsible for slight but characteristic irregularity in the dorsal outline.

*C. cottoni* is very closely allied to *C. herdmani* Calman (1904, p. 171, pl. iii, fig. 56–69, and pl. iv, fig. 60–66) and one would not hesitate to refer the South Australian specimens to that species were it not for the fact that they differ in having the exopod of the uropod distally truncate and with two distinctly articulated terminal spines. Calman in his fig. 65–66 illustrates the uropods of *C. herdmani* as he describes them—"Both rami are acutely pointed, without terminal spines."

#### LEPTOCUMA G. O. Sars.

#### LEPTOCUMA SHEARDI Hale.

*Leptocuma sheardi* Hale, 1936, p. 409, fig. 3–4.

The adult male is now available. The carapace in dorsal view is narrower than in the female. The ocular lobe is sooty, with four of the eye lenses clear, prominent and glittering. The pseudorostral lobes are produced in front of the eye-lobe, but do not come into contact. The exopod of the fourth pereopods is rudimentary as in the female and young males.

In a male 5.65 mm. in length five pairs of pleopods are well developed and bear long setae, but in an example 4.35 mm. long the abdominal appendages are rudimentary.

The uropod of the adult male is much as in the female but is armed with longer and more numerous spines and setae.

The colour pattern is remarkably uniform and is as in the type (Hale, 1936, fig. 3).

*Loc.* South Australia: Gulf St. Vincent, Port Willunga, on stones, 1 fath. (Hale and Sheard, Feb., 1937).

### FAMILY DIASTYLIDAE

#### GYNODIASTYLIS Calman.

#### GYNODIASTYLIS TRUNCATIFRONS Hale.

*Gynodiastylis truncatifrons* Hale, 1928, p. 43, fig. 13–14.

Several specimens of this distinctive species were secured at the southern end of Sellick's Reef. The type was taken five miles from shore.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, 1 fath. (Hale and Sheard, Jan., 1937).

PARADIASTYLIS Calman.

PARADIASTYLIS TUMIDA sp. nov.

*Ovigerous female.* Integument strongly indurated. Carapace one-third total length, much wider than deep; triangular in dorsal view, its greatest breadth occurring at posterior end, where it is almost as wide as long; a dorso-lateral fold or ridge on each side is marked off into three prominent tumidities; there is also a large rounded elevation at each side near the hinder margin, and from it curves forwards and downwards a swollen ridge, which does not reach to the anterior margin. Pseudorostral lobes rather narrow, meeting in front of eye lobe for a distance equal to more than one-fifth of length of carapace. Ocular lobe wide, with three unpigmented lenses. Antennal notch distinct; a distinct tooth below notch and above the rounded and serrate infero-lateral angle of carapace.

First pedigerous somite exposed, short; second and third somites short dorsally but with pleural portions lengthened and swollen above articulation of peraeopods; dorsal length of fourth somite about equal to that of first three somites together; fifth smaller than any of others.

Pleon somites one to four not markedly differing in length; fifth somite one-fourth as long again as fourth; telson three-fourths as long as fifth somite, and equal in length to sixth, with two upcurving rather prominent terminal spines and six pairs of smaller lateral spines.

First antennae with first joint barely longer than third and half as long again as second. Third maxillipeds without exopods; basis curved near proximal end, wide, and distally expanded, with a series of stout and very long plumose setae; length of basis equal to that of remaining segments together.

First peraeopods reaching but little beyond apex of pseudorostrum, basis only about two-thirds as long as rest of limb; ischium and merus each with a long plumose seta distally; carpus a little longer than propodus, half as long again as merus and three times as long as ischium; dactylus subequal in length to merus, tipped with several setae, of which one is conspicuously the stoutest; exopod short and slender. Second peraeopods widely separated from third pair; with basis very broad (two-thirds as wide as long) and having inner edge toothed; ischium suppressed; carpus barely longer than merus but nearly twice as long as propodus; dactylus shorter than propodus, with one of the terminal setae strong; exopod relatively longer and stouter than in first peraeopods. Last three pairs of peraeopods with basis shorter than remaining joints together (much shorter in fifth

pair) ; carpus much shorter than merus in third and fourth peraeopods but as long as merus in fifth ; carpus in each pair with an unusually stout and long distal seta and a slender bristle ; dactylus terminating in a strong claw-like seta, and with one or two bristles near distal end.

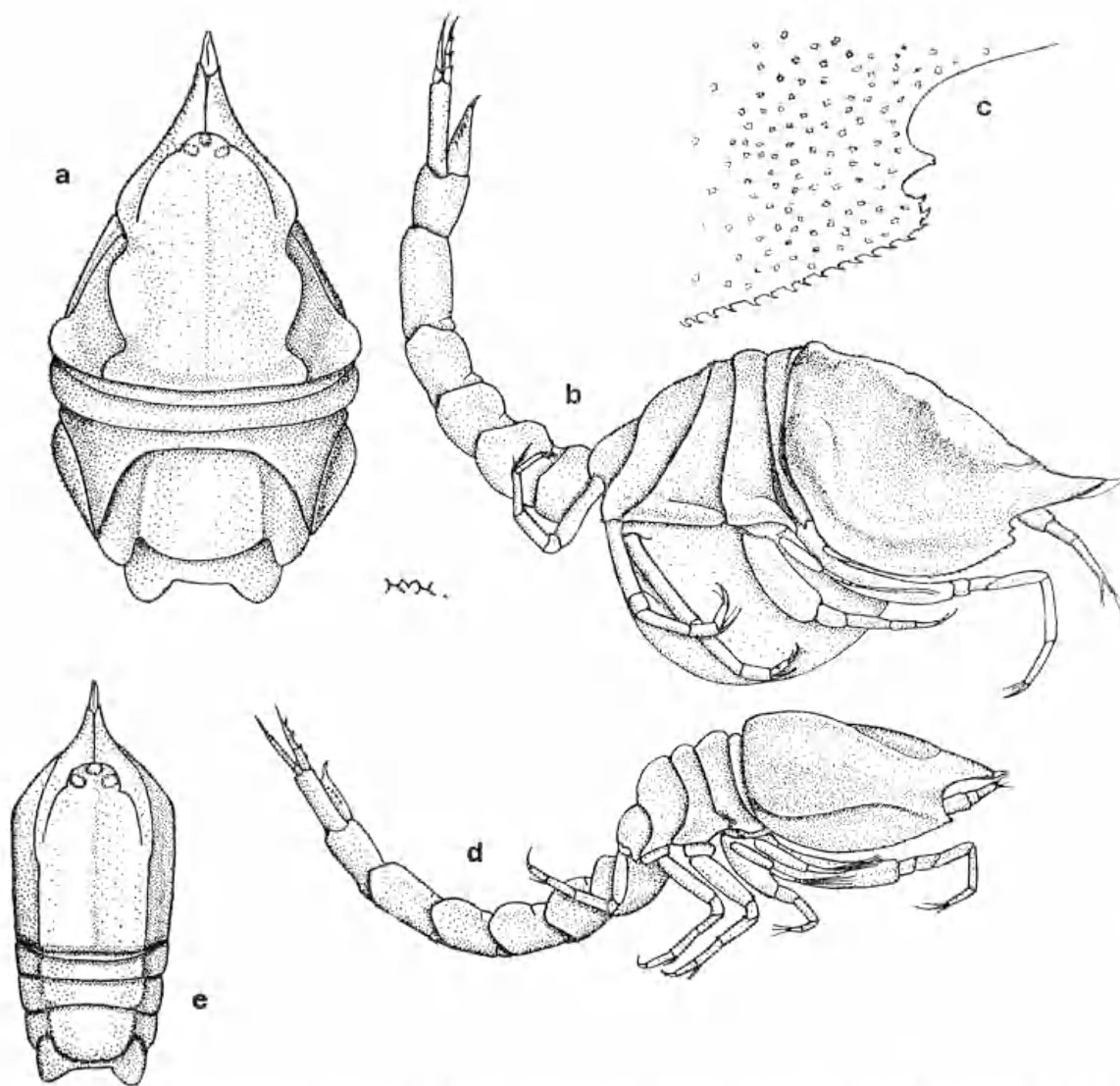


Fig. 3. *Paradiastylis tumida*. Type female; a, lateral view; b, dorsal view of cephalothorax; c, antero-lateral margin of carapace. Juvenile male; d, lateral view; e, dorsal view of cephalothorax (a-b,  $\times 26$ ; c,  $\times 60$ ; d-e,  $\times 36$ ).

Peduncle of uropods about half as long again as telson, wide (its greatest breadth nearly one-fourth the length) and armed with three spines on inner margin, two being placed near distal end; excluding the terminal spines the endopod is a little longer than exopod ; including the spines the rami are subequal in length ; endopod with first joint longer than second and the latter longer than third ; four



short spines on inner margin of endopod, one at middle of length and one at distal end of first joint, and one at distal ends of second and third joints.

Colour cream.

Length 3.75 mm.

*Juvenile male.* Carapace in dorsal view with sides parallel for posterior two-thirds, relatively much narrower and not so deep as in female; dorso-lateral and lateral ridges sharply defined and not swollen. Appendages as in female excepting that an exopod is present on the third maxilliped, the exopod of the first and second peraeopods is much stouter, and the bases of second and fourth pairs of legs are wider, with the inner margin serrate.

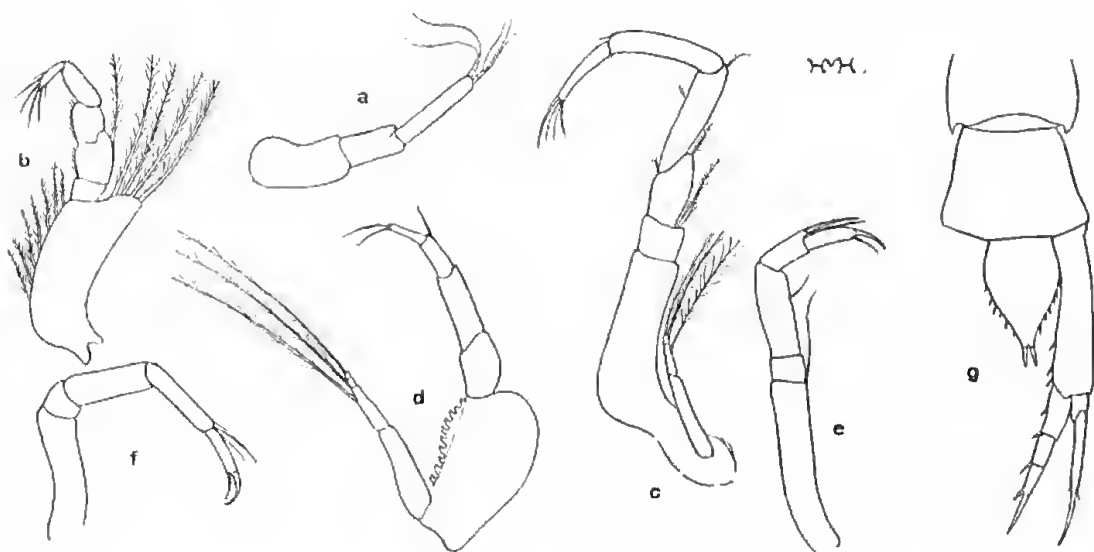


Fig. 4. *Paradiastylis tumida*. Paratype ovigerous female; a, first antenna; b, third maxilliped; c-f, first, second, third and fifth peraeopods; g, telson and uropods ( $\times 52$ ).

That the specimen is young is evidenced by the fact that exopods are absent on the third and fourth peraeopods, pleopods have not yet appeared and the second transverse suture of the endopod of the uropods is absent, although the spines are arranged as in the female; this two-jointed condition is without the slightest doubt due to immaturity.

Length 2 mm

*Loc.* South Australia: Gulf St. Vincent, Port Willunga Reef, on stones, 1 fath., and Sellick's Reef, on stones, 1 fath. (H. M. Hale and K. Sheard, Jan. and Feb. 1937). New South Wales: Sydney Harbour, Vaucluse, on stones between tide marks (T. Harvey Johnston, Jan. 1937). Types in South Australian Museum, Reg. No. C. 2144-2147.



## DIC Stebbing.

## DIC LASIODACTYLUM Zimmer.

*Dic lasiodactylum* Zimmer, 1914, p. 193, fig. 17-18; Hale, 1936, p. 422, fig. 12-13.

In recording this species from South Australia, the writer described an immature male, larger than Zimmer's types and differing in having the carapace spiny and the telson and uropods relatively much longer and markedly spinose. The collecting of further material from Sellick's and Port Willunga Reefs, shows that, as adults, both "typical" and "spiny" forms cover the same range of size. Thus, one finds ovigerous females from 3 mm. down to 2.5 mm. in length having the long spiny telson and rough carapace. On the other hand a "typical" female nearly 3 mm. in length is like Zimmer's specimens in so far as telson and uropods are concerned, but has a pair of spinules on the ocular lobe and the inferior margin of the carapace spinose (fig. 5, a).

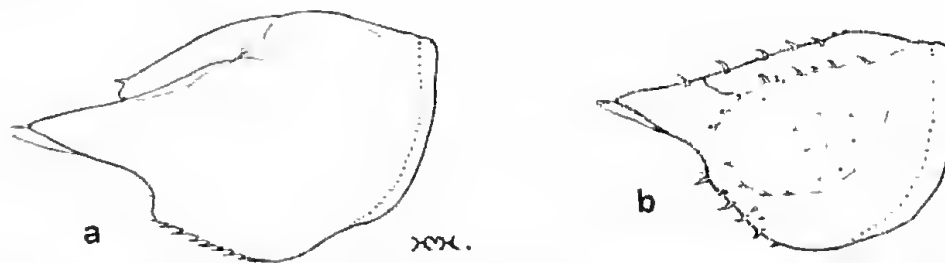


Fig. 5. a, Carapace of adult female of typical form of *Dic lasiodactylum*. b, Carapace of adult female of *Dic lasiodactylum* var. *spinicauda* ( $\times 46$ ).

As, however, the long, spiny telson consistently distinguishes the "spiny" form from "typical" specimens of the same size, the varietal name *spinicauda* is proposed for it. The carapace of var. *spinicauda* always bears a goodly number of spines arranged more or less as shown in fig. 5, b; in some examples the spines are more abundant and the dorso-lateral elevation on each side is much more marked.

## DIC BREVIDACTYLUM sp. nov.

*Ovigerous female.* Integument rather thin. Carapace about as deep as wide, less than one-third total length; in dorsal view the lateral margins, to level of base of pseudorostrum, are subparallel; surface without sculpture save for a slight dorso-lateral bulge on each side. Pseudorostral lobes upturned, meeting in front of ocular lobe for a distance equal to more than one-fourth length of carapace. Ocular lobe very wide.

All pedigerous somites fully exposed; pleural parts of first and second produced forwards, of third to fifth backwardly produced.

Pleon a little longer than thorax; telson distinctly longer than sixth somite, without armature excepting a pair of rudimentary apical spinules.

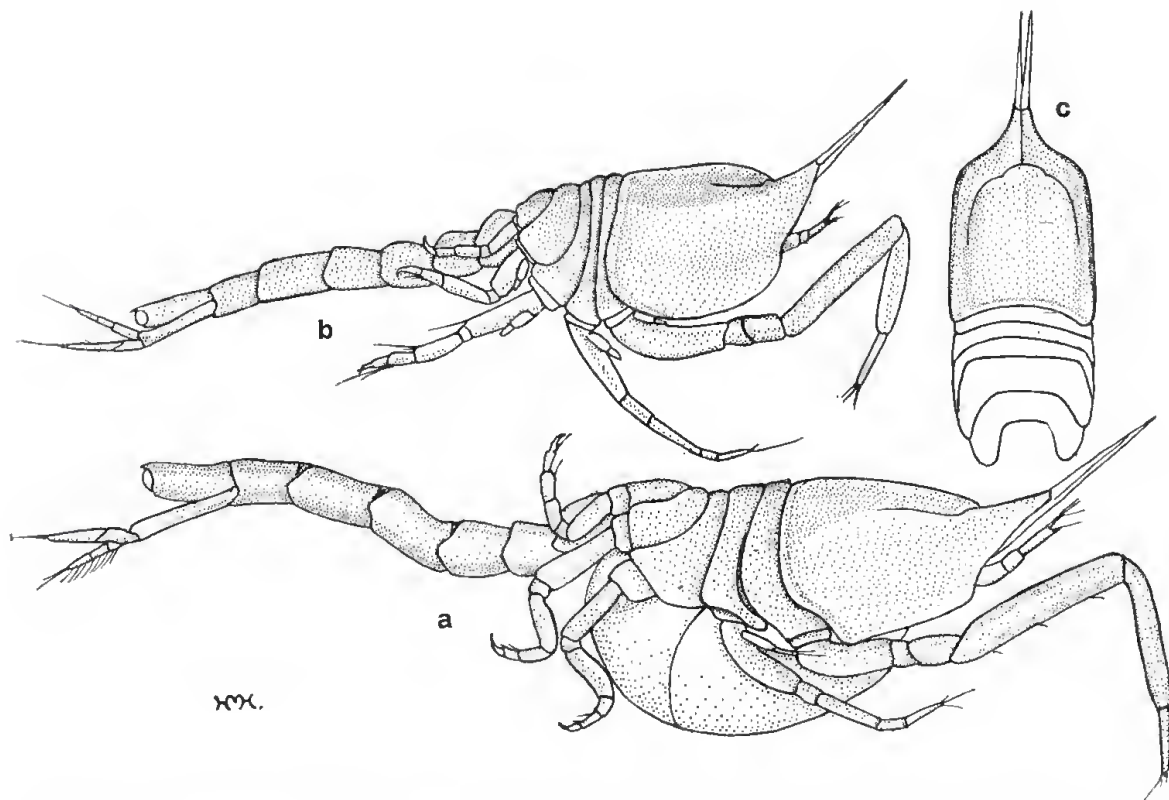


Fig. 6. *Dic brevidactylum*. a, Lateral view of ovigerous female. Juvenile male; b, lateral view; c, dorsal view of cephalothorax ( $\times 32$ ).

First peraeopods with small exopod, tipped with a few very short setae; basis one-fifth as long as remaining joints together; carpus stout, one-third as long again as propodus, which bears a long apical spine; dactylus less than half as long as propodus and with only three apical setae. Second peraeopods with small exopod bearing one or two hairs; ischium suppressed and carpus equal in length to propodus and dactylus together.

Peduncle of uropods nearly one-fourth as long again as telson, which is equal in length to exopod; endopod almost as long as exopod, with setae on inner edge, with a long terminal seta, and with third joint longer than second but shorter than first; exopod with two spines on outer margin and with three terminal setae.

Colour white.

Length 2.7 mm.

*Immature male.* Rudimentary exopods are present on the first four pairs of pereopods, and the second antennae do not nearly reach to hinder margin of carapace. Appendages otherwise much as in female.

Length 2.1 mm.

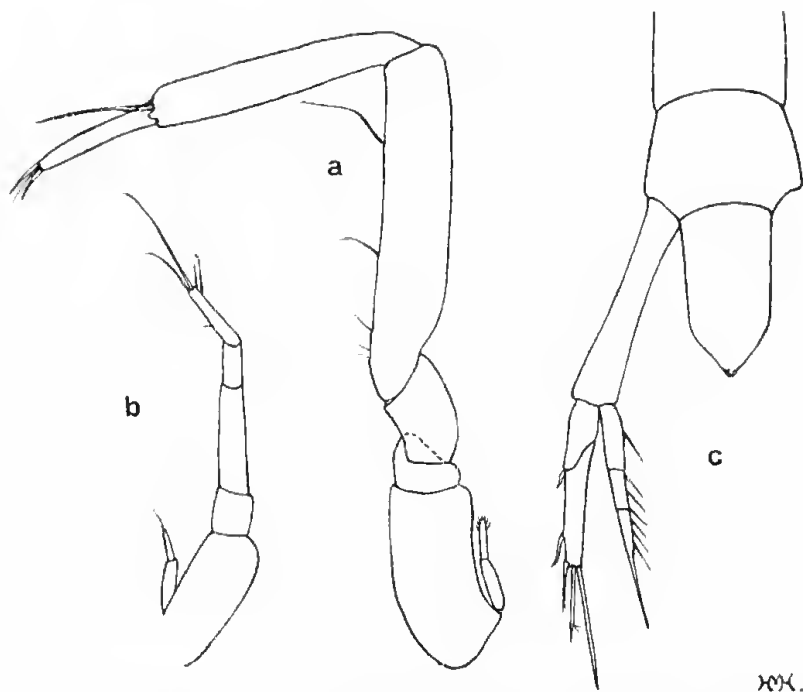


Fig. 7. *Dic brevidactylum*. Type female; a and b, first and second pereopods; c, telson and uropod ( $\times 70$ ).

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale and K. Sheard, Jan. and March 1937). Types in South Australian Museum, Reg. No. C. 2151–2152.

This species differs from *D. lasiodactylum* in the very different proportions of the segments of the first pereopods and in the absence of long bristles on the dactylus of that limb, the subparallel (instead of convergent) sides of the carapace as seen in dorsal view and in the character of the uropods.

#### PACHYSTYLIS H. J. Hansen.

*Anchicolurus* of Stebbing seems to be a synonym of *Colurostylis* Calman (Hale, 1928, p. 47 and Zimmer, 1930, p. 651). The acquisition of a male of *Pachystylis vietus* makes it increasingly difficult to separate *Colurostylis* from Hansen's genus.

## PACHYSTYLIS VIETUS Hale.

*Pachystylis vietus* Hale, 1936, p. 424, fig. 14-15.

The species was previously known only from the adult female. A single young male differs as follows. The first four peraeopods bear well-developed exopods, the accessory flagellum of the first antennae is not much shorter than the main flagellum, there are pleopods on the first two pleon somites and the apical spines of the telson, although tiny, are longer; the branches of the pleopods are rudimentary and are not furnished with long setae. The apex of the telson has two short, slender setae, in addition to the small spines, just as in the female.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef (H. M. Hale, Feb. 1937); Port Willunga (H. M. Hale and K. Sheard, Jan. and Feb. 1937); Marino (K. Sheard and B. C. Cotton, Mar. 1937).

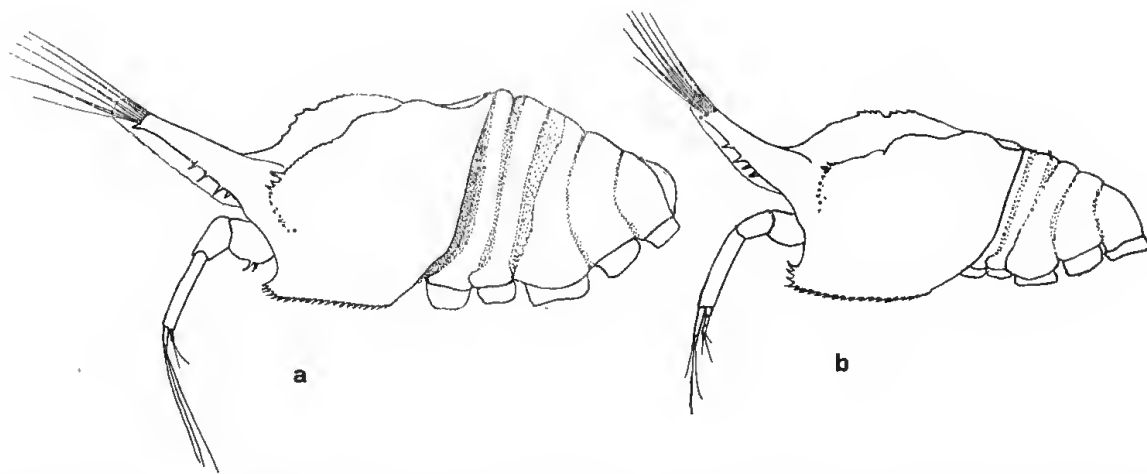


Fig. 8. *Allodiastylis cretatus*. a, Cephalothorax of adult female. b, Cephalothorax of male with form of female ( $\times 34$ ).

## ALLODIASTYLIS Hale.

## ALLODIASTYLIS CRETATUS Hale.

*Allodiastylis cretatus* Hale, 1936, p. 426, fig. 16-17.

This species was originally described from a single adult female and a single male. Further material now available reveals some curious facts.

The type female is abnormal in so far as the pseudorostrum and the anterior margin of the carapace are concerned; it has already been noted (Hale, *ut supra*, p. 428) that its first peraeopods do not form a symmetrical pair. In females now before me the pseudorostral lobes are upturned, are spinose inferiorly and have long setae radiating from the apex, while the antero-lateral angle of the carapace is

prominent and, like the inferior margin, is spinose. In lateral view the serrated dorsal margin exhibits a deeper indentation at the middle of its length and the antero-lateral portions of each dorso-lateral ridge are spinous, one of the spines being fairly prominent (fig. 8, a). The appendages and telson are as in the type female (with the exception of the malformed first right peraeopod of the latter) and no exopods are apparent on any of the thoracic limbs.

One example from South Australia (fig. 8, b) resembles the females described above, but has exopods on the third maxillipeds and first to fourth peraeopods, although they are not fully developed; the appendages generally are as in the type male. The sculpture is exactly as in the females, while the integument is indurated and chalky white, the pseudorostrum is upturned and the telson terminates in a pair of very short blunt spines, instead of long spines as in the type male.

Using the "formalin method" of collecting on a reef in New South Wales, Prof. T. Harvey Johnston secured a number of females in company with an adult male; the latter agrees in every detail with the type male. Thus, this translucent male, with raised ocular lobe, downbent rostrum, strongly ridged carapace and long telsonic spines, has now been found associated with the very different white females in two widely separated Australian localities—evidence supporting the assumption that they are the sexes of the one species.

The variation exhibited by some other Cumacea indicates the desirability of examining large series whenever possible. One may cite, for example, the range of variability of *Diastylis glabra* Zimmer (see Zimmer, 1926, pp. 57 and 72), *Nannastacus nasutus* Zimmer, *N. gibbosus* Calman, *N. zimmeri* Calman, and *Diclasiodactylum* Zimmer.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale and K. Sheard, Jan. 1937). New South Wales: Sydney Harbour, Vaucluse, on stone between tide marks (T. Harvey Johnston, Jan. 1937).

## FAMILY NANNASTACIDAE

### NANNASTACUS Spence Bate.

#### NANNASTACUS NASUTUS var. CAMELUS Zimmer.

*Nannastacus nasutus* var. *camelus* Zimmer, 1914, p. 186, fig. 13.

A number of specimens taken on South Australian reefs conform to the above variety. The eye is pigmented in all. A female 2.5 mm. in length is figured.

*Loc.* South Australia: Gulf St. Vincent, Port Willunga Reef, on stone, 2 fath. at high tide, and Sellick's Reef, on stone, 1 fath. (H. M. Hale and K. Sheard, Jan.-Feb. 1937).

*Hab.* South-western and South Australia.

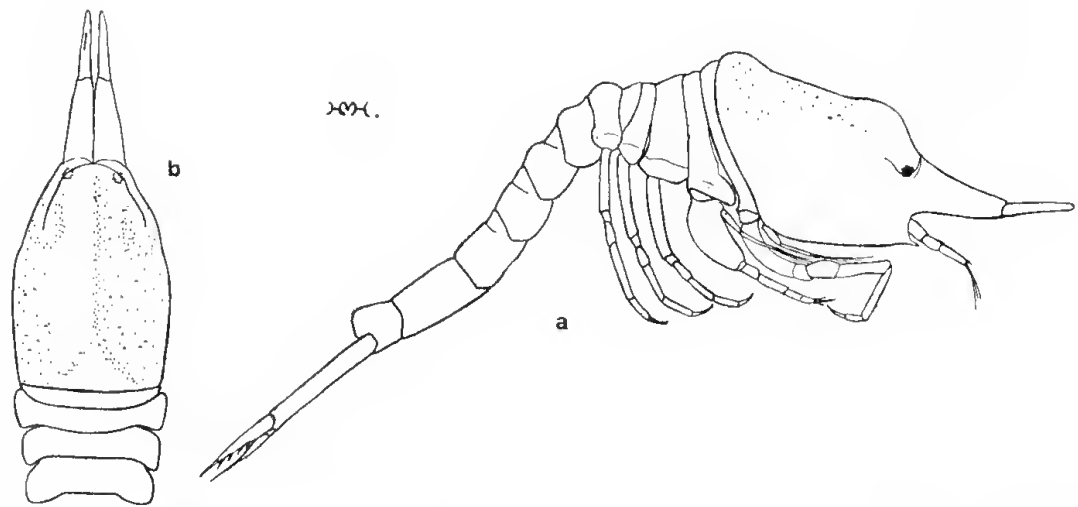


Fig. 9. *Nannastacus nasutus* var. *camelus*. Female; a, lateral view; b, dorsal view of cephalothorax ( $\times 30$ ).

#### SCHIZOTREMA Calman.

#### SCHIZOTREMA DEPRESSUM Calman.

*Schizotrema depressum* Calman, 1911, p. 361, pl. xxxiv, fig. 14-17.

Specimens of this species have now been taken in South Australian waters. Adult females attain a length of 2 mm. and have the carapace more rugose than that of smaller examples.

As noted by Calman the lateral setae of the cephalothorax and pleon are always encrusted—either with algae or mud—so that the bizarre appearance of the creature is increased.

*Loc.* South Australia: Gulf St. Vincent, Port Willunga Reef, on stones, 1 fath. (H. M. Hale and K. Sheard, Feb. 1937).

*Hab.* Gulf of Siam and South Australia.

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